

A COMPARISON OF THE FLORA OF SOUTHERN
BRITISH COLUMBIA WITH THAT OF THE
STATE OF WASHINGTON, AS ILLUS-
TRATED BY THE FLORAS OF
HENRY AND PIPER

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The Pacific Northwest, by which rather elastic term may be understood the region extending from the northern boundary of California to Prince William Sound, Alaska, and including the present States of Oregon and Washington and the Province of British Columbia, has been a fruitful field for botanical research since the days of Archibald Menzies, and still affords ample opportunity for scientific investigation. Not only does it possess a vast and diversified flora, with many species of restricted range and habitat, but there exists a marked tendency toward variability, indicating that in this geologically recent portion of the continent, the process of evolution is still active also in the plant world, and affording strong support to the upholders of the "mutation" theory. As a result of this tendency to variation, the limits of many species are not yet defined, and the relatively few students of the native flora have found themselves unable to cover the field adequately, so that anything like a comprehensive treatment of the flora of the entire region has not yet appeared. The rapid introduction of foreign species, which find in our genial climate and fertile soil conditions almost ideal for their speedy naturalization, still further complicates the situation. The Flora of Howell, that indefatigable pioneer, whose lack of scientific training was compensated for by a boundless enthusiasm and a keen and accurate power of observation, has now become almost obsolete, so that the present-day student of the Northwest flora is compelled to have recourse to a comparatively scanty list of local manuals, of very uneven scientific merit. It is a matter for congratulation therefore that Professor Henry has given to the scientific world in his recent manual*

* Henry, Joseph Kaye. Flora of Southern British Columbia and Vancouver Island. Toronto: W. J. Gage & Co. Ltd. 1915. Pp. 363. \$1.00.

the result of his long and careful study of the Northwest flora. The book has been adopted for use by the schools of the Province, and in fact grew out of Professor Henry's desire to provide for youthful students of the local flora a guide such as in his own youth he was unable to secure. The limitations of a school text have of course made it impossible for him to enter into technical taxonomic discussions, to give detailed statements of geographical range, or to confirm the included species by lists of specimens examined; but the descriptions are full and accurate, the keys carefully constructed, and a considerable number of new species and varieties are added to those already known to exist.

The author displays a sound and sane conservatism, and has not looked with favor on the minuter classification of the North American Flora. The tendency toward excessive subdivision of genera and multiplication of species has gone very far in the last two decades, and must, to use Professor Henry's words, "soon give place to the broader conception of what the 'lumper' considers constitutes a species." We accordingly find that many recently proposed genera are restored to their original position. *Piperia* and *Limnorchis* are replaced in *Habenaria*, *Batrachium* in *Ranunculus*, *Gormanina* in *Sedum*, *Comarum*, *Dasiphora*, *Argentina* and *Drymocallis* in *Potentilla*, *Sieversia* in *Geum*, *Anogra* and *Onagra* in *Oenothera*, *Oxycoccus* in *Vaccinium*, *Harrimanella* in *Cassiope*, *Collomia* in *Gilia*, *Thalesia* in *Orobanche*, *Rapuntium* in *Lobelia*, *Eucephalus* and *Machaeranthera* in *Aster*, and *Ptilocalais* in *Microseris*. Perhaps an excess of conservatism is shown in the return of *Schizonotus* to *Spiraea* and *Navarretia* to *Gilia*; but on the whole the tendency is toward a thoroughly sane conception of taxonomic relations. This is further illustrated by the refusal to recognize the recent union of Papaveraceae with Fumariaceae and Lobeliaceae with Campanulaceae, or the attempt to segregate Rosaceae into a group of too-closely related families. The nomenclature is throughout that of the International Rules, in strong contrast to the prevailing tendency among Western botanists to adopt the provincialities of the so-called "American" Code. While the Rules adopted at Vienna

are far from being adequate, they still represent the only method by which a satisfactory nomenclature can ever be attained, that of *international* agreement: and the attempt of any nation to herd by itself in these matters cannot hope for any greater success than the proposal of the "free-silverites" in the matter of a monetary standard.

Perhaps a more just estimate of the scope and value of Professor Henry's work may be attained by comparing it with another manual covering an adjacent field. In 1906 Professor C. V. Piper published a Flora of Washington (Contr. U. S. Nat. Herb., Vol. XI), which still remains in many ways a model of scientific accuracy and thoroughness. Since Washington adjoins British Columbia on the south, considerable resemblance between the floras of the two regions would be expected, and the majority of the species mentioned in the one manual might with reason be looked for in the other.

A glance at the map, however, will show that this expectation of similarity must not be carried too far. Washington extends 240 miles south of British Columbia; and no tendency in plant-distribution is more marked than the increase in the number of species away from the arctic regions and toward the tropics. The distinctively Californian flora which extends northward through Oregon and into Washington with a steadily diminishing number of representatives, seems to have reached its northernmost limit, in the case of the vast majority of species, in the neighborhood of a boundary which coincides more or less roughly with that of southern British Columbia. What may be termed the Alaskan or sub-arctic flora in like manner seems to have reached the limits within which it may be called dominant somewhere north of the 49th parallel; and although many of its members continue southward in the Rockies, this region lies too far eastward of the eastern boundary of Washington to have much influence on the flora of that state.

The exact limits of Henry's manual are not very clearly defined to the northward. In his own words, "The region covered is mainly the southern part of the province extending from Vancouver Island to the Rockies, with a rather indefinite northern

limit, to about the Skeena." Since the valley of the Skeena, with its embouchure at Prince Rupert in latitude 54° , does not cross the entire breadth of the Province, but is replaced on the eastern slope by the valley of the Peace and its tributaries, it becomes somewhat difficult to fix an exact northern limit. But in any case the territory covered by this manual cannot be less than twice as large as the State of Washington, and extends far enough to the east to take in the entire western slope of the Rocky Mountain region, which lies far to the eastward of any part of the State of Washington, so that the casual observer would not unreasonably assume that of the two Floras, Henry's would surpass Piper's in the total number of species. But over against this hasty generalization must be set the fact, not only of the steady increase of species from the poles toward the equator, but the further consideration that the Upper Sonoran Zone, which dominates the semi-arid portion of eastern Washington, and which is remarkably rich in number of species, is very scantily represented in the Province, extending but a short distance into the central plateau along the valley of the Okanogan. More than this, Washington is characterized by an endemism that is far less marked in the part of British Columbia under consideration. The number of species that have been reported from their type-locality only is surprisingly large; the Olympics, the Wenatchee Mountains, and Mount Rainier are all characterized by a strongly local flora; and the general region of the Columbia Gorge, including the greater part of the Columbia Valley from the Great Falls at Celilo to the sharp northward bend of the river at Pasco, contains a surprisingly large number of species with a very restricted local range. No such marked tendency to endemism seems to be displayed in any part of British Columbia. While the flora of Vancouver Island is perhaps the richest in species of local occurrence, and while there is a well-defined succession of botanical areas as we advance eastward from the region of coast forest into the dry interior, and then through a second humid belt to the subalpine and alpine Rocky Mountain zones, the fact remains that the tendency to diversity is less marked in British Columbia than in Washington.

We must not be surprised therefore to find that while the total number of species, varieties and named forms included in Henry's Flora is 2,359, the total enumerated by Piper reaches 2,511. Of this number, allowing for differences in nomenclature and in the views held by the two authors regarding specific limits, and excluding 28 of Henry's species that are definitely rejected by Piper, there are common to both manuals 1,517 named forms: in other words, at least 60 per cent of all the species mentioned are common to both districts.

In Henry's Flora there are 764 species and forms not mentioned by Piper; in Piper's Flora 928 not mentioned by Henry. Doubtless if the present reviewer were thoroughly conversant with the taxonomic history and bibliography of all these forms, it would be possible to reduce these figures materially by detecting identity in names that seem wholly unrelated; but neither his knowledge nor the resources at his command permit such an undertaking.

Retaining the above totals therefore, a few remarks may be offered on the species which appear in but one of the two manuals. In presenting these observations, the reviewer must presume that both authors have covered their territory with equal thoroughness. In Professor Piper's Flora, the author has appended to each species a full list of "Specimens Examined," so that it is possible to confirm very definitely each and every one; but the scope of a school text-book has not permitted Professor Henry to do this, so that a full confirmation of his species cannot be attained.

Assuming therefore that the 764 species mentioned only by Henry are all essentially different from any forms included by Piper, and that their existence within his territory can be definitely confirmed, we find that they can be grouped approximately as follows:

Two hundred and ninety-six belong to the Rocky Mountain flora, of which at least 40 may also be regarded as Alaskan, and 21 occur also on Vancouver Island; 130 are distinctly Vancouver Island species, including the 21 found also in the Rockies and 12 which are also Alaskan; 123 may be regarded as Alaskan, in-

cluding the 40 which occur also in the Rockies and the 12 also on Vancouver Island; 52 species, judging from the localities indicated, are purely local (doubtless in many cases an unwarranted assumption); 11 are mentioned without definite locality or range; 111 are introduced species, of which 48 are personally known to the reviewer as occurring in Oregon, and therefore to be expected in the intervening territory of Washington: 50 are included and assigned to definite Washington stations in the two recent manuals by Piper and Beattie, the *Flora of Southeastern Washington and Adjacent Idaho* (1914) and the *Flora of the Northwest Coast* (1915). Several others of Henry's species appear in the last-named work, but assigned only to Canadian stations.

In addition to the above, there are 57 species which are given a range by Henry that either explicitly refers them to Washington, or brings them so near the border that it would seem reasonable to expect them on the other side, but which find no mention in Piper's *Flora* or the two later works of which he is joint author. This comparatively small margin of discrepancy would be doubtless further reduced by a wider knowledge of the specific and varietal limits of these forms, and a more thorough exploration of the territory.

Turning now to the reverse side of the comparison, and examining the 928 forms included by Piper but not mentioned by Henry, we find that they fall into several clearly-defined groups. Beginning with those of the most restricted range and proceeding outward, we may roughly group them as follows:

1. Species that have been reported from the type-locality only, 67.

2. Species that belong to regions of marked endemism, without being restricted to the original station:

- In the Olympics, 15
- On Mount Rainier, 8
- In the Wenatchee Mountains, 21
- In the Columbia Gorge and
Klickitat County, 96.

3. Species occurring only in Washington, without restriction to one of the above regions, 107.

4. Species not occurring south of Washington, but with an eastern range, to Idaho, Montana, Colorado, etc., 72.

5. Species occurring in Washington and Oregon only, 114.

6. Species not occurring south of Oregon, but with an eastward range, 67.

7. Species extending from Washington to California, Nevada or Arizona, 364.

Of the above list, 115 are species that are definitely referred by the author to the Upper Sonoran Zone.

The number of these Washington species which are either referred outright to British Columbia in Piper's statement of range, or given a range that would justify us in expecting them in the Province, is 107, of which 19 are introduced. In both manuals therefore, the extreme margin of probable error is not excessive.

A careful study of all these differences and discrepancies leads to two conclusions:

1. That Washington, partly because of the different climatic conditions due to its more southern position, and partly because of its topography, is a region of more marked endemism than British Columbia.

2. That although artificial boundaries are usually wholly without significance in determining plant-distribution, the 49th parallel seems to come very near to a line that marks the extreme northward dominance of the Californian flora on the one hand, and the extreme southern extension of the Alaskan or sub-arctic flora on the other. As far as the introduced plants are concerned, their occurrence or non-occurrence is a matter of very slight significance, since their establishment at any particular station is usually the result of pure accident, and no obstacle to their further spread will usually exist. Some further details of the differences between the two Floras may be of interest.

Fifty-five genera represented in Henry are not found in Piper, but 30 of these include only introduced species (among these *Ulmus* with 3 species, *Dianthus*, *Cynosurus* and *Vinca* with 2 each, and 26 others with one each). *Androsace* with 4 species is the largest indigenous genus not represented in Piper, next come *Limnanthes* and *Primula* with 2 each, and 22 others with one each.

Piper's Flora on the other hand includes 76 genera not mentioned by Henry, of which only 3 (*Syntherisma*, *Dipsacus* and *Cnicus*) are introduced. The largest indigenous genus not represented in Henry is *Sitanion* with 11 species. Next to this is *Capnoorea* with 5, *Sphaerostigma* and *Frasera* with 4, *Hemicarpha*, *Horkelia*, *Taraxia* and *Madronella* with 3, and *Parrya*, *Thermopsis*, *Elatine*, *Pachylophus*, *Trichostema* and *Tonella* with 2; 59 other genera are represented by a single species.

The following table represents the discrepancies in the two Floras in the case of a few of the larger genera, particularly of those that reach their widest extension in the Northwest:

	No. Forms in Piper	No. Forms in Henry	No. Common	Piper Only	Henry Only
<i>Poa</i>	33	27	18	15	9
<i>Carex</i>	108	140	61	52	65
<i>Juncus</i>	33	31	24	10	7
<i>Salix</i>	23	39	18	7	21
<i>Eriogonum</i>	28	10	6	23	4
<i>Polygonum</i>	34	30	24	12	6
<i>Ranunculus</i>	30	34	21	9	13
<i>Arabis</i>	20	12	10	10	2
<i>Saxifraga</i>	18	32	12	7	20
<i>Potentilla</i>	29	28	18	8	10
<i>Lupinus</i>	35	22	15	20	7
<i>Astragalus</i>	33	19	13	20	6
<i>Viola</i>	20	23	15	6	8
<i>Lomatium</i>	23	11	9	15	2
<i>Pentstemon</i>	27	12	10	17	2
<i>Asler</i>	32	27	16	16	11
<i>Erigeron</i>	25	37	18	8	19
<i>Senecio</i>	31	32	17	14	15

These figures seem to show that in genera with a predominantly *northern* range, Henry's total of local species will exceed Piper's; while in those with a *southern* range the converse will be true. In the case of *Carex*, about all that seems to be illustrated is the fact that neither author had been able to make an exhaustive study of the genus or arrive at any clear understanding of its species. It is to be hoped that the much-needed clearing-up of this difficult problem will be attained by the careful work which K. K. Mackenzie is now doing on the genus. In matters of form and technique, which with a few notable exceptions remain the weak point of American authors, the reviewer re-

grets to note considerable carelessness in Professor Henry's book. He announces in his preface his intention of capitalizing only "some old Linnean generic names still retained for species and those derived from the names of persons"; but on the one hand we find him writing *Italica*, *Monspeliensis*, *Major*, *Sibiricum*, *Beeringianum*, *Andina*, *Davuricum*, *Moschatus*, and on the other *convolvulus*, *paronychia*, *cymbalaria*, *aquifolium*, *malus*, *parthenium* as specific names.

Occasionally he overlooks the fact that under the International Rules trinomials are not written without an indication of the category of the third member, as subspecies, variety or forma, and we read *Populus nigra Italica*, *Anemone patens Wolfgangiana*. In general, however, the subdivisions of species are more clearly differentiated than in Piper, whose disposition to regard the terms "subspecies" and "variety" as identical has led to much confusion. But Henry does not always avoid the absurdity of identical binomials, as *Phegopteris phegopteris*, *Hypopitys hypopitys* (misspelled in the text). Failures in grammatical agreement are far too common, such as: *Equisetum arvensis*, *Equisetum variegatum* var. *Alaskana*, *Pleuropogon refractum* (an error to which most Western writers stubbornly cling), *Cypripedium parviflora*, *Gormania oregonum*, *Sedum rosea*, *Rubus viburnifolia*, *Geum humilis*, *Acer circinatum* var. *fulva*, *Maka moschatus*, *Phyllodoce glanduliflorus*, *Mimulus Lewisii* var. *alba*, *Mimulus Langsdorfii* var. *minima*, *Symphoricarpos racemosa*, *Aster Lindleyana*, *Erigeron membranaceum*, *Agoseris villosum*.

This carelessness is the more regrettable, since several of these blunders are found in the case of new species and varieties proposed by the author!

Orthographical blunders are so common as to make us wonder whether the author read his proof at all. In the case of generic names we are compelled to read: *Hordum*, *Commandra*, *Hesperus*, *Hypopites*, *Asperuga*, *Eriganum*, *Seriocarpus*: and in specific names: *Poa Fenderiana*, *Papaver sominferum*, *Alyssum alysoides*, *Cakile edulenta*, *Philadelphus Lewesii*, *Boykinia circinnata*, *Potentilla monspeliensis*, *Cymopterus terebinthus*, *Boschniakia strobiliacea*, *Campanula rotundifolia* var. *petiotala*, *Xanthium*

candense and *Coreopsis Atkinsonia*. The name of the Water-Lily Family is spelled Nymphaeaceae. Trelease's name appears as "Trelease," Betecke's as "Beteche," and Moquin is abbreviated "Mog."

In this matter of abbreviations the author seems to have proceeded on the theory that variety is the spice of life, and along with the accepted forms he occasionally treats us to the following: Haus. for Haussknecht, Bick. for Bicknell, Wat. for Watson, Par. for Parlatore, Mich. for Michaux (wholly forgetting that this abbreviation belongs to Micheli), Scrib. for Scribner, Mer. for, Merrill, Thur. for Thurber, Vil. for Villars, Buck. for Buckley, Hitch. and Hitche. for Hitchcock, Brit. for Britton, Beuth. for Bentham, Fer. for Fernald, Englem. for Engelmann, Ren. for Rendle, Walle. and Walls. for Wallroth.

Often the abbreviation is written without the period, as if it were the full name, as Rosen, Lindl, Schrad, Bickn, Led, Hook, Kaulf, Lamb, . . . On the other hand, full names are frequently written as if abbreviations (Hoppe., Presl., Morong.). Presl also appears as Prisl and Wiegand as Weigand.

The authority for species is often omitted entirely, as in the case of

<i>Polygonum Nuttallii</i>	which should be assigned to Small
<i>Polygonum minimum</i>	“ “ “ Watson
<i>Myosurus minimus</i>	“ “ “ Linnaeus
<i>Onobrychis sativa</i>	“ “ “ Lamarck
<i>Papaver somniferum</i>	“ “ “ Linnaeus
<i>Medicago arabica</i>	“ “ “ Hudson
<i>Erigeron filifolius</i>	“ “ “ (Hooker)
	Nuttall

Citations of authorities are frequently incorrect.

Puccinellia angustata (R. Br.) R. & R. should be (R. Br.) Nash.

Lysichiton kamschatcense Schott should be (L.) Schott.

Corylus californica Rose should be (A.DC.) Rose.

Sagina occidentalis Green [sic] should be Wats.

Vancouveria hexandra M. & C. should be (Hook.) Morr. & Dec.

Athysanus pusillus Greene should be (Hook.) Greene.

Cytisus scoparius Link should be (L.) Link.

Circaea pacifica Arch. [sic] should be Aschers. & Magn.

Valerianella samolifolia Haeck. should be (DC.) A. Gray.

Chrysopsis villosa Nutt. should be (Pursh) Nutt.

Such miscellaneous inaccuracies as "Fallarone Is." for Faral-lone: "L. Her." for L'Her. and "D. C." for DC. are also encountered. The species *Montia parviflora* appears twice, and *M. parvifolia* as a consequence wholly disappears. After *Epipactis*, "R.BR." is written where the common name is usually given. Elsewhere authors of genera have not been cited.

A praiseworthy attempt has been made to indicate the derivation of generic names; but 141 genera are left unexplained, and in the case of others such absurd blunders as *Peranium* from "*per*, through, *amium*, love, in allusion to medicinal properties" (no such word as "amium" exists in the Latin language), *Humulus*, "dim. of *humus*, the ground, because sometimes prostrate" (the root is Teutonic, and has no relation to the Latin *humus*) and *Malvastrum* from "*Malva* and *aster*, a star" (when it is simply the contemptuous diminutive) are perpetuated, evidently all borrowed from Frye and Rigg's Northwest Flora, which as a masterpiece of etymological inaccuracy can hardly be surpassed. Nuttall and Pursh are hardly to be regarded as "English" botanists, when their period of greatest scientific activity was spent in the United States.

In spite of these regrettable defects of form, however, the impression left by Professor Henry's book is, that it is a praiseworthy and valuable effort to contribute to the fuller knowledge of the Northwest flora, and that the work has been surprisingly well done considering that the author makes no claims to being a professional botanist. It is only by such local studies that a full understanding of the fascinating but difficult flora of the Northwest can ever be reached; and it is to be hoped that at some future time Professor Henry may shake off the limitations imposed by a school text, and revise his manual in strictly scientific form.